

Space Studies of the Upper Atmospheres of the Earth and Planets including Reference Atmospheres (C)

Probing the Lower-Thermosphere-Ionosphere with In-situ Measurements (C1.4)

Consider for oral presentation.

PROBING THE LOWER-THERMOSPHERE-IONOSPHERE IN-SITU WITH SMALL SPACECRAFT

Dr. Therese Jorgensen, therese.moretto@gmail.com

NASA Ames Research Center, Mountain View, California, United States

Rebecca Bishop

The Aerospace Corporation, Los Angeles, United States, rebecca.l.bishop@aero.org

Scott Palo

University of Colorado, Boulder, United States, palo@colorado.edu

Nikolaos Paschalidis

NASA/GSFC Heliophysics Science Division, Greenbelt, United States, nikolaos.paschalidis@nasa.gov

Charles Swenson

Utah State University, Logan, United States, charles.swenson@usu.edu

The LTI at Earth spans the altitude range of about 90km to 200km. These altitudes do not lend themselves easily to exploration by neither balloons nor orbiting spacecraft. As a consequence, only few in-situ measurements from the region exist, provided by sounding rocket campaigns and a few low-dipping Atmospheric Explorer missions in the 1970s. This has left a critical need for simultaneous and co-located measurements of comprehensive sets of physical parameters to characterize both the neutral and plasma constituents. Such observations with extensive coverage in time and space are crucial to advancing our understanding of the energetics, dynamics, and chemistry of this complex region of the Earth's atmosphere. Not all observables are accessible through remote sensing so novel approaches and technological solutions are called for to obtain the needed in-situ measurements.

Over the last decade, small spacecraft systems have proven their capability to provide some of these observations. Miniaturized instruments for electric and magnetic fields as well as for plasma and neutral gas densities, composition, and winds have been developed and proven in space along with a large number of small satellite systems. Huge progress is also seen in the development of small satellite technology in support of large constellations. This paper will review some of the main developments and discuss their relevance and potential for exploration of the LTI.